AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A color image segmentation method for segmenting a color image into a plurality of regions, comprising the steps of:

(a) calculating a first value representing a degree of difference between a pixel and peripheral pixels from the color of peripheral pixels based on a plurality of pixel values of an input image, wherein the color includes levels of one color,

(b) obtaining a converted image by converting the first value into a value of a predetermined scale, and

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(c) segmenting the converted image.

2. (original): The color image segmentation method according to claim 1, wherein the step (c) segments the converted image based on a region growing method.

3. (currently amended): The color image segmentation method according to at least one of claim 1 or claim 2, wherein prior to the step (a), said method further comprises the step of (p-a) quantizing pixel values of the input image into a predetermined number of representative ~~quanatized~~ quantized pixel values.

4. (original): The color image segmentation method according to claim 3, wherein the representative pixel values consist of 10-20 values.

5. (original): The color image segmentation method according to claim 1 or claim 2, wherein prior to the step (a), said method further comprises the steps of:

(p-a-1) defining a window containing a center pixel; and

wherein said step (a) further comprises calculating a second value representing the degree of difference between a pixel and peripheral pixels from the color of peripheral pixels with respect to pixels in the defined window.

6. (original): The color image segmentation method according to claim 3, wherein prior to the step (a), said method further comprises the steps of:

(p-a-1) defining a window containing a center pixel; and

wherein said step (a) further comprises calculating a second value representing the degree of difference between a pixel and peripheral pixels from the color of peripheral pixels with respect to pixels in the defined window.

7. (original): The color image segmentation method according to claim 1 or claim 2, wherein the step (a) comprises the steps of:

(a-1) defining a window which is centered at a pixel p and has a size of d x d when d is a positive integer, said window having a set of pixels Z; and

(a-2) classifying a pixel position of each pixel of set Z into one of a C number of classes when i is a number between 1 and C; and

(a-3) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i is an average of positions of Ni data points in class Z;, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

8. (original): The color image segmentation method according to claim 3, wherein the step (a) comprises the steps of:

(a-1) defining a window which is centered at a pixel p and has a size of d x d when d is a positive integer, said window having a set of pixels Z; and

(a-2) classifying a pixel position of each pixel of set Z into one of a C number of classes when i is a number between 1 and C; and

(a-3) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i is an average of positions of N_i data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

9. (original): The color image segmentation method according to claim 4, wherein the step (a) comprises the steps of:

(a-1) defining a window which is centered at a pixel p and has a size of d x d when d is a positive integer, said window having a set of pixels Z; and

(a-2) classifying a pixel position of each pixel of set Z into one of a C number of classes when i is a number between I and C, and

(a-3) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i is an average of positions of N_i data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

10. (original): The color image segmentation method according to claim 5, wherein in said step (p-a-1), said window has a size of d x d when d is a positive integer, said window having a set of pixels Z, and the step (a) comprises the steps of:

(a-1) classifying a pixel position of each pixel of set Z into one of a C number of classes when i is a number between 1 and C, and

(a-2) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m; as said second value is an average of positions of Ni data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

11. (original): The color image segmentation method according to claim 6, wherein in said step (p-a-1), said window has a size of d x d when d is a positive integer, said window having a set of pixels Z, and the step (a) comprises the steps of:

(a-1) classifying a pixel position of each pixel of set Z into one of a C number of 5 classes when i is a number between 1 and C, and

(a-2) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i as said second value, is an average of positions of N_i data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

12. (original): The color image segmentation method according to claim 7, wherein d is an integer inclusive of and between 3 and 10.

13. (original): The color image segmentation method according to claim 8, wherein d is an integer inclusive of and between 3 and 10.

14. (original): The color image segmentation method according to claim 9, wherein d is an integer inclusive of and between 3 and 10.

15. (original): The color image segmentation method according to claim 10, wherein d is an integer inclusive of and between 3 and 10.

16. (original): The color image segmentation method according to claim 11, wherein d is an integer inclusive of and between 3 and 10.

17. (original): The color image segmentation method according to at least one of claim I or claim 2, wherein the predetermined scale is a gray scale having values between 0 and 255.

18. (original): The color image segmentation method according to claim 3, wherein the predetermined scale is a gray scale having values between 0 and 255.

19. (original): The color image segmentation method according to claim 4, wherein the predetermined scale is a gray scale having values between 0 and 255.

20. (original): The color image segmentation method according to claim 5, wherein the predetermined scale is a gray scale having values between 0 and 255.

21. (original): The color image segmentation method according to claim 6, wherein the predetermined scale is a gray scale having values between 0 and 255.

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22. (original): The color image segmentation method according to claim 7, wherein the predetermined scale is a gray scale having values between 0 and 255.

23. (original): The color image segmentation method according to claim 8, wherein the predetermined scale is a gray scale having values between 0 and 255.

24. (original): The color image segmentation method according to claim 9, wherein the predetermined scale is a gray scale having values between 0 and 255.

25. (original): The color image segmentation method according to claim 10, wherein the predetermined scale is a gray scale having values between 0 and 255.

26. (original): The color image segmentation method according to claim 11, wherein the predetermined scale is a gray scale having values between 0 and 255.

27. (original): The color image segmentation method according to claim 12, wherein the predetermined scale is a gray scale having values between 0 and 255.

28. (original): The color image segmentation method according to claim 13, wherein the predetermined scale is a gray scale having values between 0 and 255.

29. (original): The color image segmentation method according to claim 14, wherein the predetermined scale is a gray scale having values between 0 and 255.

30. (original): The color image segmentation method according to claim 15, wherein the predetermined scale is a gray scale having values between 0 and 255.

31. (original): The color image segmentation method according to claim 16, wherein the predetermined scale is a gray scale having values between 0 and 255.

32. (original): An object-based color image processing method for processing a color image according to a color image segmentation method, wherein the color image segmentation method comprises the steps of:

(a) calculating a first value representing a degree of difference between a pixel and peripheral pixels from the color of peripheral pixels based on a plurality of pixel values of an input image;

(b) obtaining a converted image by converting said first value into a value of a predetermined scale; and

(c) segmenting the converted image.

33. (original): The color image processing method according to claim 32, wherein the color image processing method complies with the MPEG-7 standard.

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34. (original): A color image segmentation method for segmenting a color image into a plurality of regions, comprising the steps of:

(a) quantizing pixel values of an image into a number of representative pixel values; (b) calculating a first value representing a degree of difference between a pixel and peripheral pixels from the color of pixels in a predetermined size window using quantized representative pixel values;

(c) obtaining a converted image by converting said first value into a value of a predetermined scale; and

(d) segmenting the converted image using a segmentation method based on a region to growing method.

35. (original): The color image segmentation method according to claim 34, wherein the step (b) comprises the steps of:

(b-1) defining a window B which is centered at a pixel p and has a size of d x d when d is a positive integer, said window having a set of pixels Z; and

(b-2) classifying a pixel position of each pixel of set Z into one of a C number of classes when i is a number between 1 and C, and

(b-3) obtaining a J-value as said first value with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i is the average of positions of N_i data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

36. (original): The color image segmentation method according to claim 35, wherein d is an integer inclusive of between 3 and 10.

37. (original): The color image segmentation method according to one of claim 34 to claim 36, wherein the predetermined scale is a gray scale having values between 0 and 255.

38. (original): A medium for storing program codes performing a color image segmentation method for segmenting a color image into a plurality of regions, wherein the medium comprises computer readable code means for:

(a) quantizing pixel values of an image into a number of representative pixel values;

(b) calculating a first value representing a degree of difference between a pixel and peripheral pixels from the color of pixels in a predetermined size window using quantized representative pixel values;

(c) obtaining a converted image by converting said first value into a value of a predetermined scale; and

(d) segmenting the converted image using a segmentation method based on a region growing method.

39. (original): The medium according to claim 38, wherein means (b) comprises computer readable code means for:

(b-1) defining a window which is centered at a pixel p and has a size of d x d when d is a positive integer and Z is a set of all pixels in said window; and

(b-2) classifying each pixel position of the set of pixels Z into one of a C number of classes when i is a number between I and C, and

(b-3) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m; is the average of positions of N_i data points in class Z_i, i=1 to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

40. (original): The medium according to claim 39, wherein d is set as an integer inclusive of and between 3 and 10.

41. (original): The medium according to one of claim 38 to claim 40, wherein the predetermined scale is a gray scale having values between 0 and 255.

42. The method according to claim 7 further comprising:

(d) checking for effectiveness of segmentation of step (c) according to a result of

$$\overline{J} = \frac{1}{N}\sum_{k} M_k J_k$$

where J_k is the J value of a region k,

M_k is a number of pixel points in region k, and

N is a total number of pixel points in the window.

43. (original): The medium of claim 38 further comprising a computer readable means for:

(e) checking for effectiveness of segmentation of provided by means (d) according a result

$$\overline{J} = \frac{1}{N}\sum_{k} M_k J_k$$

where J_k is the J value of a region k,

M_k is a number of pixel points in region k, and

N is a total number of pixel points in the window.

44. (original): The color image segmentation method according to claim 4, wherein prior to the step (a), said method further comprises the steps of:

(p-a-1) defining a window containing a center pixel; and

wherein said step (a) further comprises calculating a second value representing the degree of difference between a pixel and peripheral pixels from the color of peripheral pixels with respect to pixels in the defined window.

45. (original): The color image segmentation method according to claim 44, wherein in said step (p-a-1), said window has a size of d x d when d is a positive integer, said window having a set of pixels Z, and the step (a) comprises the steps of:

(a-1) classifying a pixel position of each pixel of set Z into one of a C number of s classes when i is a number between 1 and C, and

(a-2) obtaining a J-value, as said first value, with respect to each pixel in a class-map as:

$$J = \frac{S_B}{S_W} = \frac{S_T - S_W}{S_W}$$

where m_i as said second value is an average of positions of Ni data points in class Z_i, i=l to C, and

$$S_T = \sum_{z \in Z} \|z - m\|^2 \text{ and } S_W \sum_{i=1}^{C} S_i = \sum_{i=1}^{C} \sum_{z \in Z_i} \|z - m_i\|^2$$

46. (original): The color image segmentation method according to claim 45, wherein d is an integer inclusive of and between 3 and 10.

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47. (original): The color image segmentation method according to claim 44, wherein the predetermined scale is a gray scale having values between 0 and 255.

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48. (original): The color image segmentation method according to claim 45, wherein the predetermined scale is a gray scale having values between 0 and 255.

49. (original): The color image segmentation method according to claim 46, wherein the predetermined scale is a gray scale having values between 0 and 255.